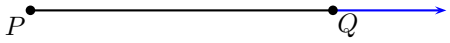
Compass and Straightedge Construction of a Square

The material in this document is adapted from *PlanetMath*.

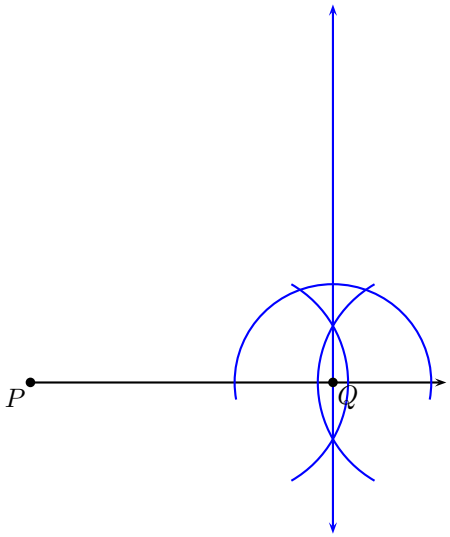
One can construct a square with sides of a given length s using compass and straightedge as follows:

(1) Draw a line segment of length s. Label its endpoints P and Q.

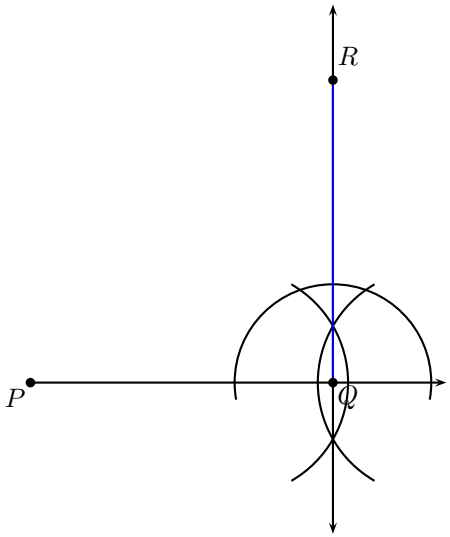
(2) Extend the line segment past Q.



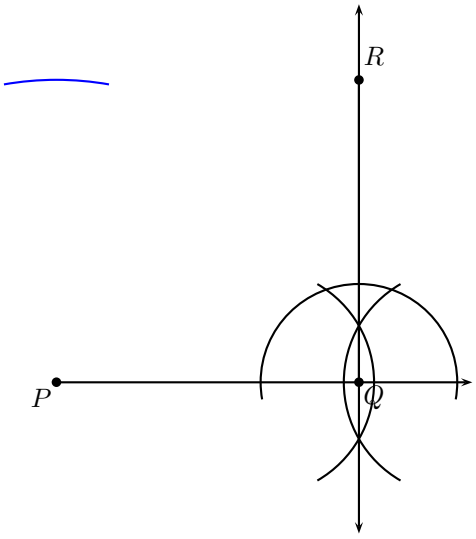
(3) Construct the line that is perpendicular to $\overrightarrow{PQ}$ at Q.



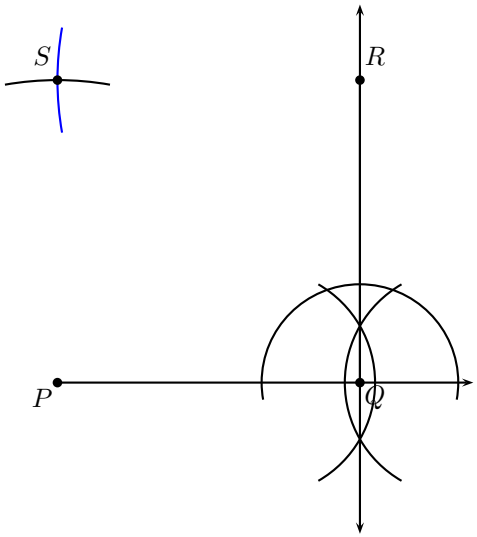
(4) Using the line drawn in the previous step, mark off a line segment of length s such that one of its endpoints is Q. Label the other endpoint as R.



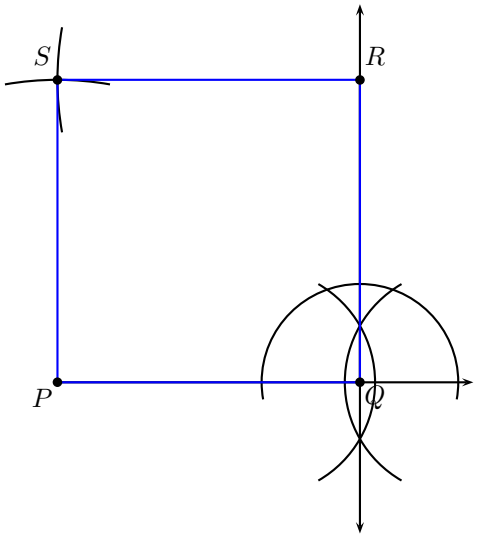
(5) Draw an arc of the circle with center P and radius $\overline{PQ}$.



(6) Draw an arc of the circle with center R and radius $\overline{QR}$ to find the point S where it intersects the arc from the previous step such that $S \neq Q$.



(7) Draw the square $PQRS$.



This construction is justified because $PS = PQ = QR = QS$, yielding that $PQRS$ is a rhombus. Since $\angle PQR$ is a right angle, it follows that $PQRS$ is a square.